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Installation and User Manual

for frequency inverters ELDI

(Revision NEW)

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1 Introduction

The transistor frequency inverter, type ELDI, are intended for speed control of standard three-phase asynchronous motors. They work on the principle of double conversion of electrical power AC-DC-AC, where the motor is supplied with a manageable by frequency and amplitude three phase voltage.

1.1 Disclaimer

ELECTROINVENT delivers optimized tested equipment such as inverters. The correct integration and interconnection of the equipment must be made according to the manuals and datasheets of ELECTROINVENT and is the responsibility of the System Integrator. ELECTROINVENT does not accept liability for system design, dimensioning of system related parts, installation or the performance of the system.

The content of this manual is regularly reviewed for compliance with the hardware and software operation and any corrections are included in later editions. Every effort is made to ensure the details in this manual are accurate. Warranty claims will not be accepted in case of violation of the installation instructions and we do not accept liability in case of accidents caused by inappropriate handling or work performed by unauthorized personnel which results in personal injury or damage to devices, or any other subsequent damages.

1.2 IMPORTANT SAFETY INSTRUCTIONS

READ AND SAVE THESE INSTRUCTIONS!

This manual contains important safety and operating instructions for ELDI inverters. Keep it with or near the inverter at all times.

Transistor frequency inverters operate with lethal voltages and the work described here should only be performed by authorized personnel familiar with the installation, mounting, commissioning, and the operation of frequency inverters. This manual must be fully read and understood before installing or commissioning is performed. The ELDI product must only be used for its intended purpose and unauthorized personnel are not allowed to open the product. The faultless and safe operation of the product assumes appropriate transport, correct storage, installation and mounting as well as correct operation and maintenance. The relevant regional and country-specific regulations and instructions must be obeyed as well as requirements described in this document including placement and installation instructions (e.g. connection profiles, torque settings, etc.)

Symbols and warning signs used:

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE refers to address practices not related to personal injury. Failure to observe could lead to property damage.

2 Warnings and Notes

WARNING

The local installation standards must be obeyed.

WARNING

The device must only be installed, operated and maintained by qualified personnel.

WARNING

The device carries lethal grid voltages. Consider a capacitor discharge time of **10 minutes**, before starting assembly or disassembly the power output terminals.

WARNING

Consider all safety instructions displayed on the inverter and in the installation and user manual!

WARNING

If any information is unclear, please refer to ELECTROINVENT.

NOTICE

Loss of warranty.

The frequency inverter must not be damaged and no holes are allowed to be drilled in the cabinet. Any transport damage must be reported to ELECTROINVENT.

3 Mechanical installations and environment

The inverters got degree of protection IP20 and they are intended to work in dry and ventilated environment without dust or corrosion agents presented. Also could be mounted in closed cabinets if:

- The minimum distance between inverter and surrounding walls or any other installed apparatuses should be in accordance with *Figure 3.1*:

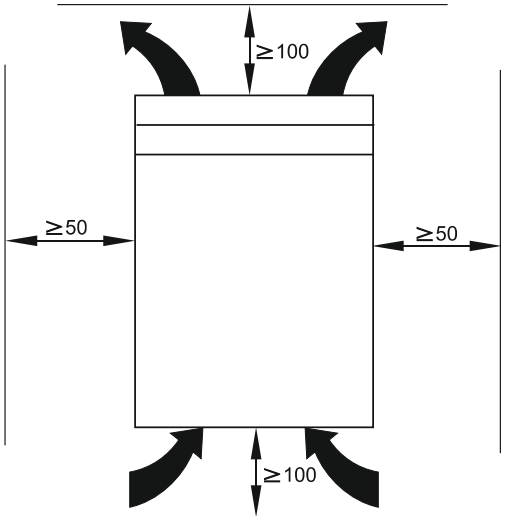


Figure 3.1 Minimum distance

- No heating equipment in close of the inverter
- The inverter must be intalled vertically, so the power block could be naturally ventilated
- Provide forced ventilation, if 45℃ in the cabinet are exceeded.

3.1 Running in exploitation

WARNING

The device carries lethal grid voltages.

For safe operation it is necessary to observe the following rules:

- The device must only be installed, operated and maintained by qualified personnel.
- To comply with the declared value of the supply voltage, both the inverter and the controlled motor.
- The recommended main circuit breaker can not be strengthened or replaced with more powerful.
- After switching off the supply voltage you must wait minimum 10 minutes, before starting assembly or disassembly the power output terminals.

The inverter has built-in electronic protections that stop the motor in case of emergency. These situations may be caused both by mechanical issues with motor and by issues associated with the supply grid.

The input supply voltage of the inverter must be disconnected before starting assembly or disassembly the motor.

The products and materials presented in this document may be changed or modified at any time, either from a technical point of veiw or in the way they operate. Their description can in no way be considered contractual.

If the inverter is properly installed, maintained and operated as intended in accordance with the requirements of the relevant product and correspond to the current instruction, it complies with the requirements for electromagnetic compatibility and interference immunity.

User is responsible for providing the conditions under which the final product will cover those standards.

3.2 Operating conditions, storage and transport

The operating condition for frequency inverters are described in *Table 3.1.*

Table 3.1. Operating conditions

Parameters:	***Condition:***
Ambient temperature	from +5°C to +45°C
Humidity	80% at 30°C
Surrounding area	explosion-proof area in the absence of electrically conductive particles, gases and vapors in concentration with destructive impact
Altitude	max. 3000м

The nominal output power is reduced by 1% every 100 meters when the inverter is installed in an environment with an altitude above 1000 m.

Example: at 1500m Pout.= 0,95Pnom.

The conditions for transport and storage are listed in *Table 3.2*.

Table 3.2 Conditions for transport and storage

Parameters:	***Condition:***
Ambient temperature	from -20°C to +50°C
Humidity	80% at 30°C

4 Technical parameters

*Table 4.1. Technical parameters of **ELDI / M** and **ELDI / A***

Dimension \ Type		ELDI / M			ELDI / A				
Rated output power	kW	0,37	0,55	0,75	0,55	0,75	1,1	1,5	2,2
Input voltage	V_{AC}	200 ÷ 230 V1~ ± 10%							
Input frequency	Hz	50 / 60 ± 5%							
Input current	A	4,4	5,3	7,6	5,3	7,6	10,2	13,5	18,0
Output voltage	V_{AC}	3 x 0…. Uin							
Output frequency	Hz	0,5 ÷ 200 (option - 512)							
Nominal output current	A	2,2	3,0	4,3	3,0	4,3	5,9	7,1	10,1
Current overload (max. for 60 sec.)	A	150% I_H once per 10 minutes							
Dissipated power at nominal load	W	40	48	55	48	55	65	85	110
Max impulse current when dinamic braking	A	4			6				

*Table 4.2. Technical parameters of **ELDI / B** and **ELDI / DF***

Dimension \ Type		ELDI / B								ELDI / DF	
Rated output power	kW	0,55	0,75	1,1	1,5	2,2	3,0	4,0	5,5	7,5	11,0
Input voltage	V_{AC}	380 ÷ 400 V3~ ± 10%									
Input frequency	Hz	50 / 60 ± 5%									
Input current	A	2,1	2,9	4,2	5,1	6,5	9,2	12,5	16,0	21,5	31,8
Output voltage	V_{AC}	3 x 0…. Uin									
Output frequency	Hz	0,5 ÷ 200 (option - 512)									
Nominal output current	A	2,0	2,3	3,2	4,2	6,0	7,6	10,2	12,5	16,0	22,0
Current overload (max. for 60 sec.)	A	150% I_H once per 10 minutes									
Dissipated power at nominal load	W	40	52	80	110	135	155	180	180	270	450
Max impulse current when dinamic braking	A	6			8		10			17	

*Table 4.3. Technical parameters of **ELDI / D***

Dimension \ Type		ELDI / D							
Rated output power	kW	15	18,5	22	30	37	45	55	75
Input voltage	V_{AC}	380 ÷ 400 V3~ ± 10%							
Input frequency	Hz	50 / 60 ± 5%							
Input current	A	42,9	52,9	62	82	94	112	125	175
Output voltage	V_{AC}	3 x 0…. Uin							
Output frequency	Hz	0,5 ÷ 200 (option - 512)							
Nominal output current	A	29	36	42	62	72	85	105	138
Current overload (max. for 60 sec.)	A	150% I_H once per 10 minutes							
Dissipated power at nominal load	W	550	680	720	840	920	1100	1300	1500
Max impulse current when dinamic braking	A	17			40		60		100

4.1 Overall and mounting dimensions

The overall and mounting dimensions of the inverters are shown on *Figure 4.1* and *Table 4.4*.

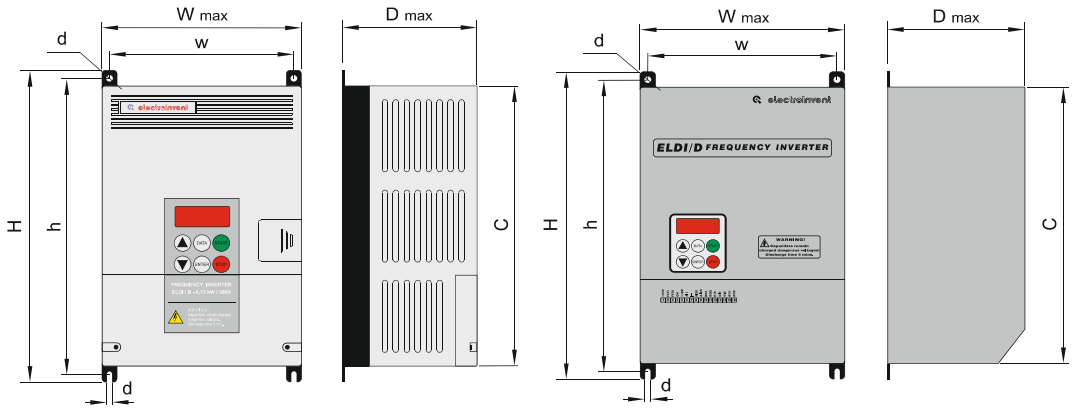


Table 4.1. Overall and mounting dimensions

Table 4.4. Overall and mounting dimensions

Type /, kW	*H, mm*	*Wmax, mm*	*Dmax, mm*	*C, mm*	*h, mm*	*w, mm*	*d, mm*
ELDI M / 0,37 - 0,75	160	86	103	140	150	72	5
ELDI A / 0,5 - 0,75	210	130	105	180	195	105	6
ELDI A / 1,1 – 2,2	210	130	140	180	195	105	6
ELDI B / 0,5 – 1,1	210	130	105	180	195	105	6
ELDI B / 1,5 – 2,2	210	130	140	180	195	105	6
ELDI B / 3,0	245	130	140	215	230	105	6
ELDI B / 4,0 – 5,5	280	130	140	250	265	105	6
ELDI DF / 7,5 – 11,0	340	175	186	300	320	140	7
ELDI D / 15,0	310	210	180	285	295	180	7
ELDI D / 18,5 – 30,0	410	275	250	370	390	235	9
ELDI D / 37,0 – 75,0	655	315	270	580	620	263	13

4.2 Mounting ELDI inverter

For trouble-free operation of the inverter is necessary to comply with the following requirements:

- Between output terminals of the inverter and motor must not have any commutation apparatuses as contactors, circuit breakers, relays, and more!
- Do not connect the supply voltage to the output terminals U, V, W !
- The inverters are intended for 3-phase asynchronous motors connected in a scheme, where there is correspondence between the supply voltage of the motor and output voltage of the inverter!
- Do not connect the zero phase of the grid to the output terminals U, V, W !

The power terminal connection diagrams of **ELDI / M** and **ELDI / A** are shown on *Figure 4.2* and *Figure 4.3.* The descriptions of the symbols are listed in *Table 4.5.*

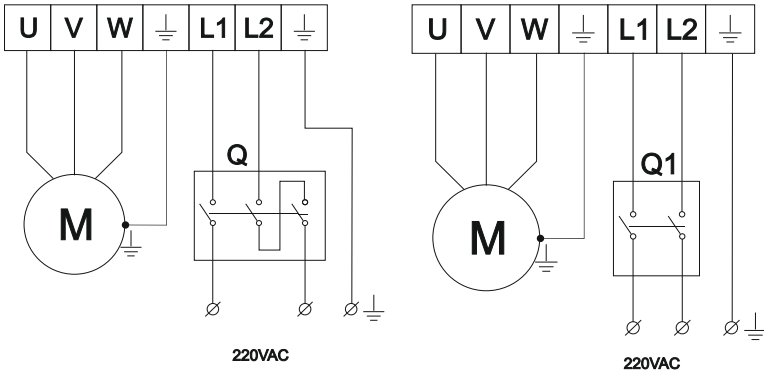


Figure 4.2. Power connection diagram of ELDI / M

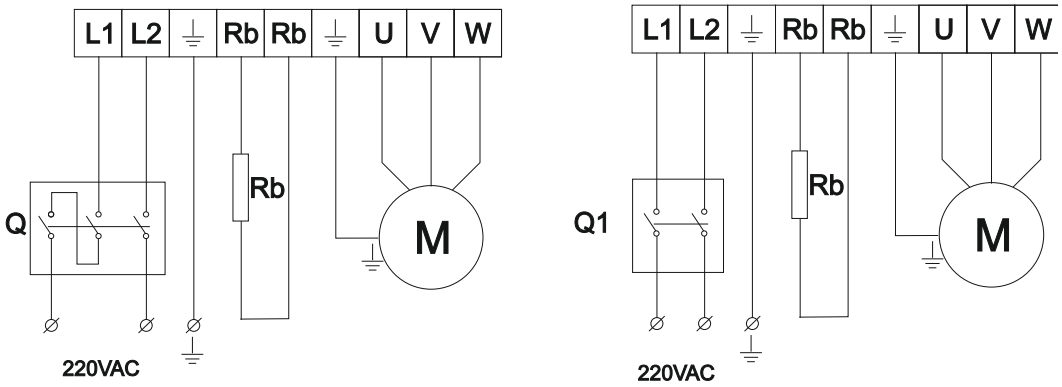


Figure 4.3. Power connection diagram of ELDI / A

Table 4.5. Descriptions of the symbols

Symbol:	***Description:***
L1, L2	Supply voltage 200-230 V_{AC} / 50-60 Hz
U	Connecting the motor in scheme △
V	
W	
⏚	Protective Earth (PE)
Rb	Output for external braking resistor
Rb	
Q	Circuit breaker (Q – tripolar; Q1 – dipolar)

On *Figure 4.4, Figure 4.5 и Figure 4.6* are shown the power connection diagrams of **ELDI/B**, **ELDI/DF** and **ELDI/D**. The descriptions of the used symbols are listed in *Table 4.6.*

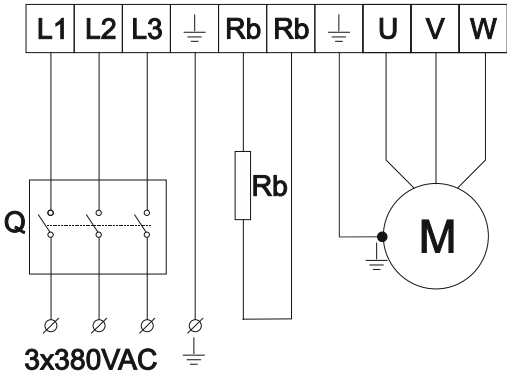


Figure 4.4. Power connection diagram of ELDI / B

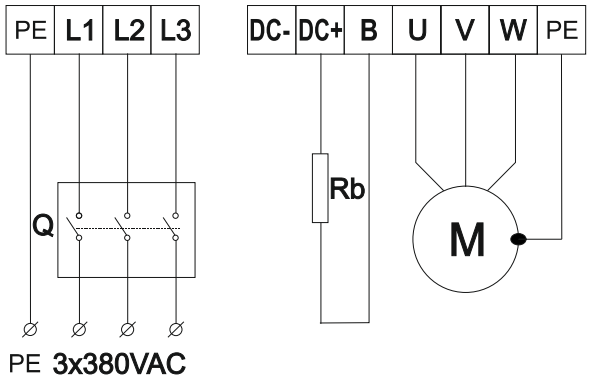


Figure 4.5. Power connection diagram of ELDI / DF

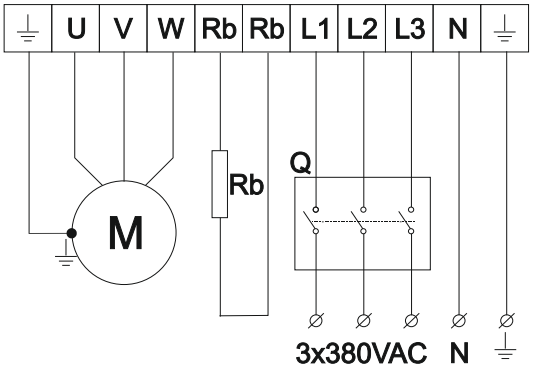


Figure 4.6. Power connection diagram of ELDI / D

Table 4.6. Descriptions of the symbols

Symbol:	Description:
U	Motor terminals
V	
W	
Rb	Output for external braking resistor
Rb	
L1	Supply voltage 3x380-400 V_{AC} / 50-60Hz
L2	
L3	
N	Operating zero
⏚	Protective Earth (PE)
Q	Circuit breaker
+, -	Polarity of the capacitor battery

When performing wiring diagrams of the power terminal, the requirements for section of the connecting wires must be observed. In *Table 4.7-1* and *Table 4.7-2* you can find the recommended sections of the connecting wires where the line length is not greater than 10 m, and also the values of the input circuit breaker.

Table 4.7-1. Recommended sections of the connecting wires

	ELDI / M u ELDI / A			ELDI / B				
Power, kW	**0,37-0,55**	**0,75**	**1,1-2,2**	**0,55-0,75**	**1,1**	**1,5**	**2,2**	**3,0-5,5**
Input, mm^2 (L1, L2, L3, N, PE)	1,0	1,5	2,5	1,0	1,0	1,5	1,5	2,5
Output, mm^2 (U, V, W, PE)	1,0	1,0	2,5	1,0	1,0	1,5	1,5	2,5
Input circuit breaker QF, A	1,0	16	25	10	10	10	10	20

Table 4.7-2. Recommended sections of the connecting wires

	ELDI / DF		ELDI / D							
Power, kW	**7,5**	**11**	**15**	**18,5**	**22**	**30**	**37**	**45**	**55**	**75**
Input, mm^2 (L1, L2, L3, N, PE)	4,0	4,0	6,0	10	10	16	25	35	35	50
Output, mm^2 (U, V, W, PE)	4,0	4,0	6,0	10	10	16	25	35	35	50
Input circuit breaker QF, A	25	40	50	63	100	100	125	125	125	160

4.3 Connecting of braking resistor

The braking resistor is used to extinguish energy. It is required during braking or reversing the direction of the motor that drives mechanisms with large inertia mass. Recommended values of resistance and capacity of the resistor are given in *Table 4.8-1* and *Table 4.8-2.*

Table 4.8-1. Recommended values

Type	***ELDI / A***			***ELDI / B***					
Power, kW	**0,55**	**0,75**	**1,1-2,2**	**0,55-0,75**	**1,1**	**1,5**	**2,2**	**3,0-4,0**	**5,5**
Braking resistor, Ω	100			700	350		100	150	110
Power of resistor, W	20	25	30	35			50	50	50
Type braking resistor	FR-ABR-0,75K		FR-ABR-2,2K	FR-ABR-H0,75K	FR-ABR-H1,5K		FR-ABR -H2,2K	FR-ABR -H3,7K	FR-ABR -H5,5K

Table 4.8-2. Recommended values

Type	***ELDI / DF***		***ELDI / D***							
Power, kW	**7,5**	**11**	**15**	**18.5**	**22**	**30**	**37**	**45**	**55**	**75**
Braking resistor, Ω	75	52	2x18	30		25		20		12
Power of resistor, W	200	1500	1500	2500		5000		7500		10000
Type braking resistor	FR-ABR -H7,5K	FR-ABR -H11K	FR-ABR -H15K							

WARNING

In braking mode on terminals Rb the voltage reaches 780Vdc. Must be taken measures to ensure the necessary clearances when installing the resistors.

WARNING

Input terminals Rb is not protected against short circuits. When there is a short circuit, terminals Rb or touching a bare wire to housing or land, can damage the inverter.

The technical parameters of braking resistors are shown in *Table 4.9* (for inverters with power from 0.55kW to 7.5kW) and in *Table 4.10* (for inverters with power from 11kW to 15 kW).

The overall and mounting dimensions of the braking resistors are shown on *Figure 4.7 (corresponding to Table 4.9)* and *FIgure 4.8 (corresponding to Table 4.10).*

Table 4.9. The overall and mounting dimensions of the braking resistors

Type of braking resistor		Invenrter		Dimension, mm					Braking resistor, Ω	Crimping terminal, mm	
		Power, kW	Supply voltage	W	W1	W2	D	H		B	d
200V	FR-ABR-0,75K	0,55 - 0,75	220 V_{AC}	215	200	175	40	21	100	7,0	4,3
	FR-ABR-2,2K*	1,1 - 2,2	220 V_{AC}	240	225	200	50	26	60	7,0	4,3
400V	FR-ABR-H0,75K	0,55 - 0,75	3x380-400 V_{AC}	140	125	100	40	21	700	7,0	4,3
	FR-ABR-H1,5K	1,1 – 1,5	3x380-400 V_{AC}	215	200	175	40	21	350	7,0	4,3
	FR-ABR-H2,2K	2,2	3x380-400 V_{AC}	240	225	200	50	26	250	7,0	4,3
	FR-ABR-H3,7K	3,7 (4,0)	3x380-400 V_{AC}	215	200	175	61	33	150	7,0	4,3
	FR-ABR-H5,5K	5,5	3x380-400 V_{AC}	335	320	295	61	33	110	9,5	5,3
	FR-ABR-H7,5K	7,5	3x380-400 V_{AC}	400	385	360	80	40	75	9,5	5,3

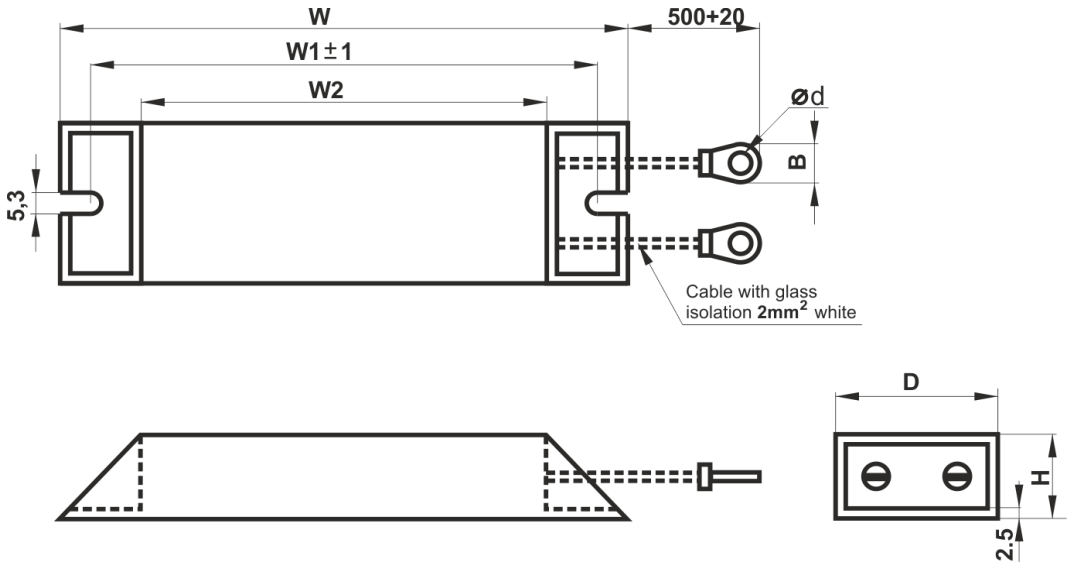


Figure 4.7. The overall and mounting dimensions of the braking resistors from Table 4.9

Table 4.10. The overall and mounting dimensions of the braking resistors

Type of braking resistor		Invenrter		Dimension mm			Braking resistor, Ω	Crimping terminal, mm
		Power, kW	Supply voltage	W	W1	W2		d
400V	FR-ABR-H11K	11	3x380-400 V_{AC}	400	385	360	52	6,4
	FR-ABR- H15K *	15	3x380-400 V_{AC}	300	285	260	2 x 18	8,4

* For H15K, you must connect the two resistors (18Ω) consecutively.

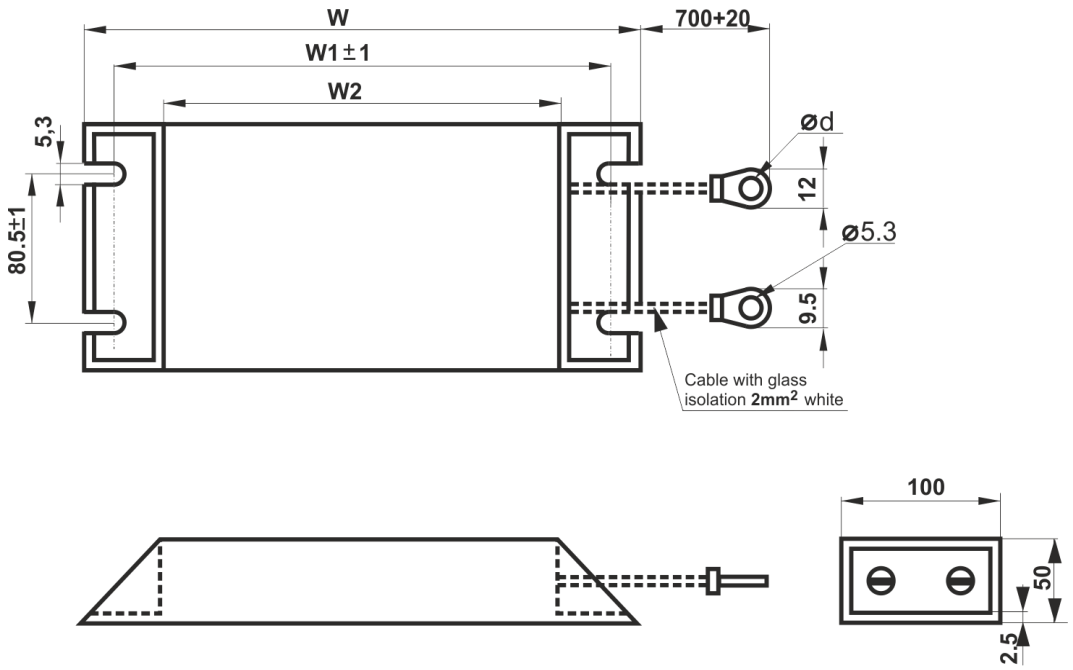


Figure 4.8. The overall and mounting dimensions of the braking resistors from Table 4.10

4.3.1 Electromagnetic compatibility

The inverter must be installed, maintained, used and adjusts in accordance with this instruction. To achieve compliance with the requirements for electromagnetic compatibility is necessary strict adherence to recommendations for installation and operating reliability below:

- Use shielded power cables, connecting the inverter with the motor and the inverter with the braking resistor (where available);
- Grounding of the shielded cable should be on a common screw marked with PE near to inverter;
- The cables must be grounded at both ends;
- Installation of input filter to inverter;
- Installation of the inverter and the equipment in a metal cabinet;

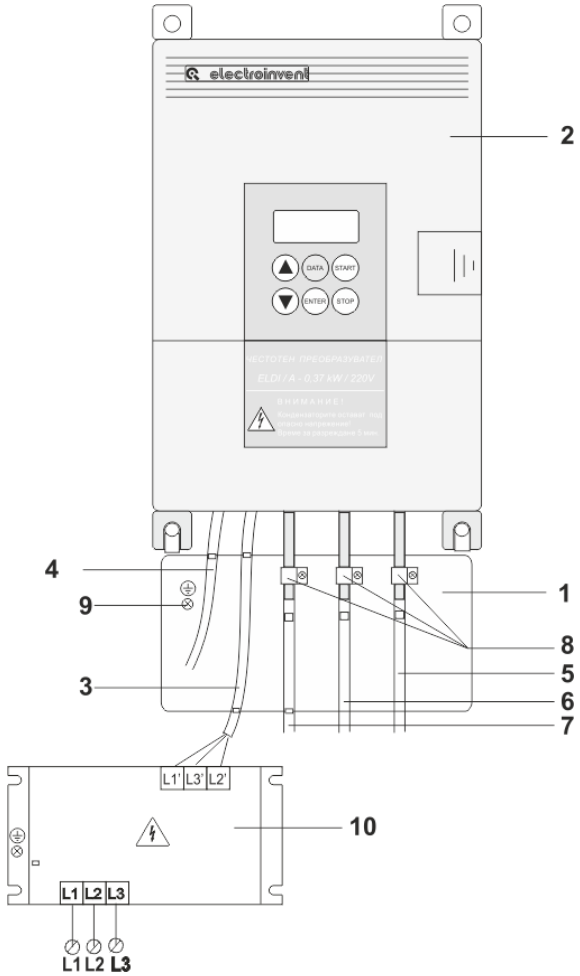


Figure 4.9. Mounting connection diagram for inverter with power 0,55kW to 5,5kW (four core scheme)

1. Ground plate;
2. ELDI inverter;
3. Ungrounded power cables;
4. Ungrounded conductors for output relay contacts of the inverter;
5. A shielded wire for connecting the output of the inverter with the motor. The shielding is grounded at both ends. The shielding must not be interrupted, and if there are intermediate terminals, they must be grounded in metal boxes.
6. Shielded cable for management and control. For applications that require a large number of conductors must be used such with small cross-section (0,5 mm^2). The shielding is grounded at both ends. The shielding must not be interrupted, and if there are intermediate terminals, they must be grounded in metal boxes.
7. A shielded cable to connect the braking resistor, if it is used. The shielding is grounded at both ends. The shielding must not be interrupted, and if there are intermediate terminals, they must be grounded in metal boxes.

8. The attachment and connection to ground of the shielding of the conductors 6, 7 and 8 are made as close as possible to the inverter as follows:
   - remove the isolation
   - use stainless steel brackets with suitable size for the places from which it was removed the isolation of the wires and attach them to the grounding plate 1. The bracket must be fixed to the plate strong enough to get a good contact.
9. Grounding screw.
10. Input filter connected directly to the power supply with unshielded wire.

Note: Although there is grounding between the inverter, motor and shielding of the wire it is necessary to connect the protective cables PE (green-yellow) to the appropriate terminals on each device.

4.3.2 Connection block scheme – ELDI/B

The connection block scheme of the inverter ELDI/B with power from 0,55kW to 5,5kW when using input filter is shown in *Figure 4.10.*

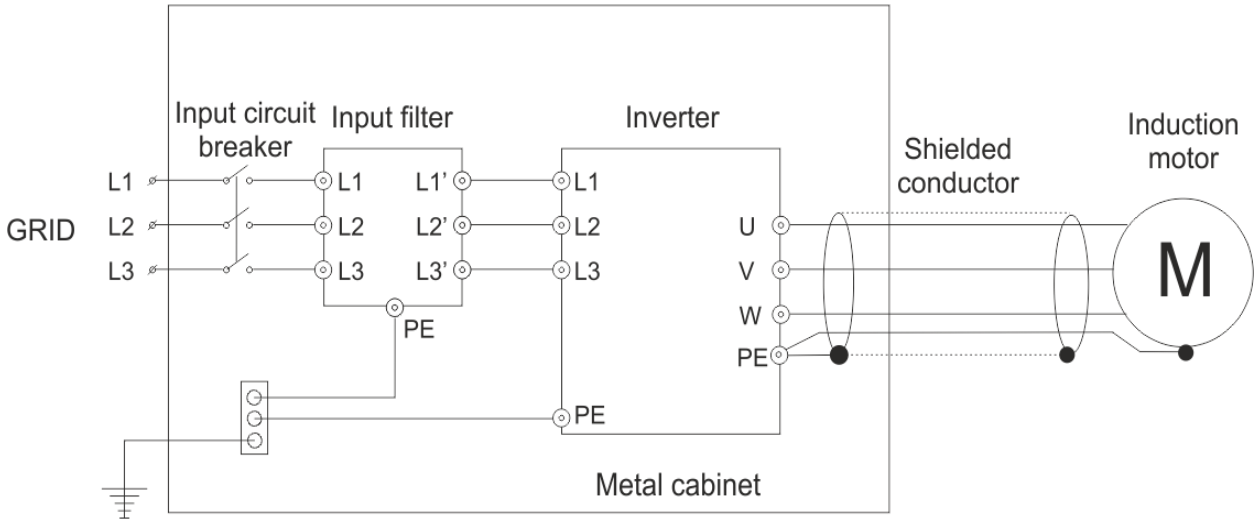


Figure 4.10. Connection block scheme of inverter type ELDI / B – from 0,55 to 5,5 kW

The types of input filter are shown in *Table 4.11.*

Table 4.11. Type of input filter - from 0,55 to 5,5 kW

Type of filter	***Power of the inverter, kW***
3MF-400/8	from 0,55 to 3,0
3MF-400/16	from 4,0 to 5,5

The overall and mounting dimensions of the input filter are shown on *FIgure 4.11*:

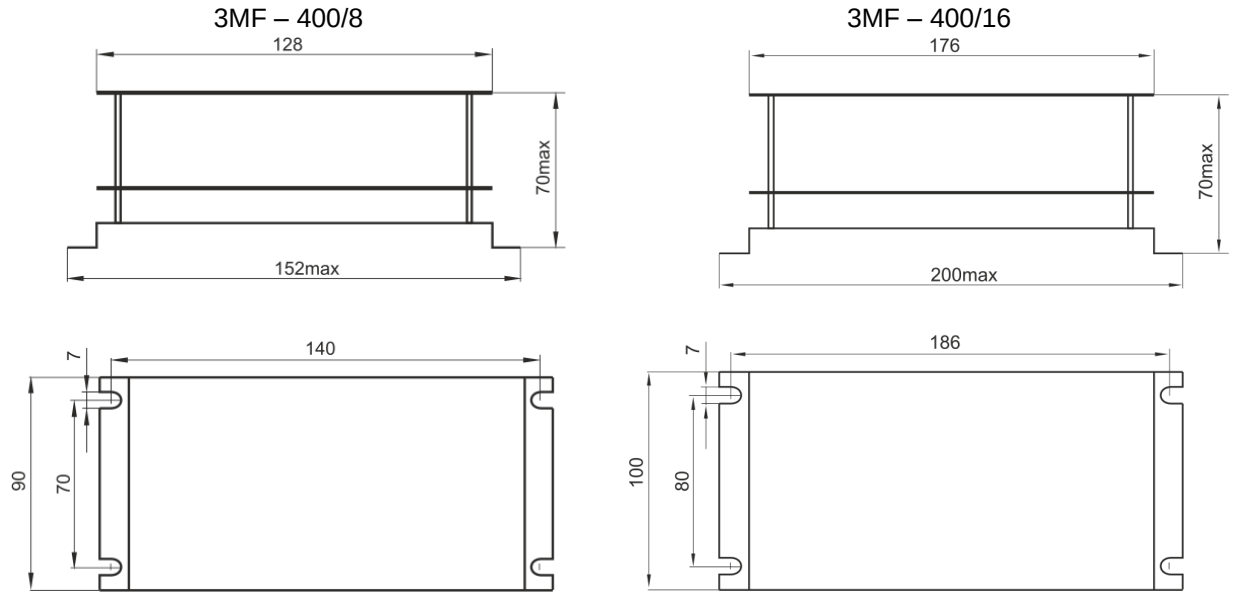


Figure 4.11. Overall and mounting dimension of the input filter

4.3.3 Connection block scheme – ELDI / DF and ELDI / D

For inverters type ELDI/DF and ELDI/D with power from 7,5kW to 55kW we recommend the use of three-phase input (GRID) choke connected according the scheme below (*Figure 4.12*):

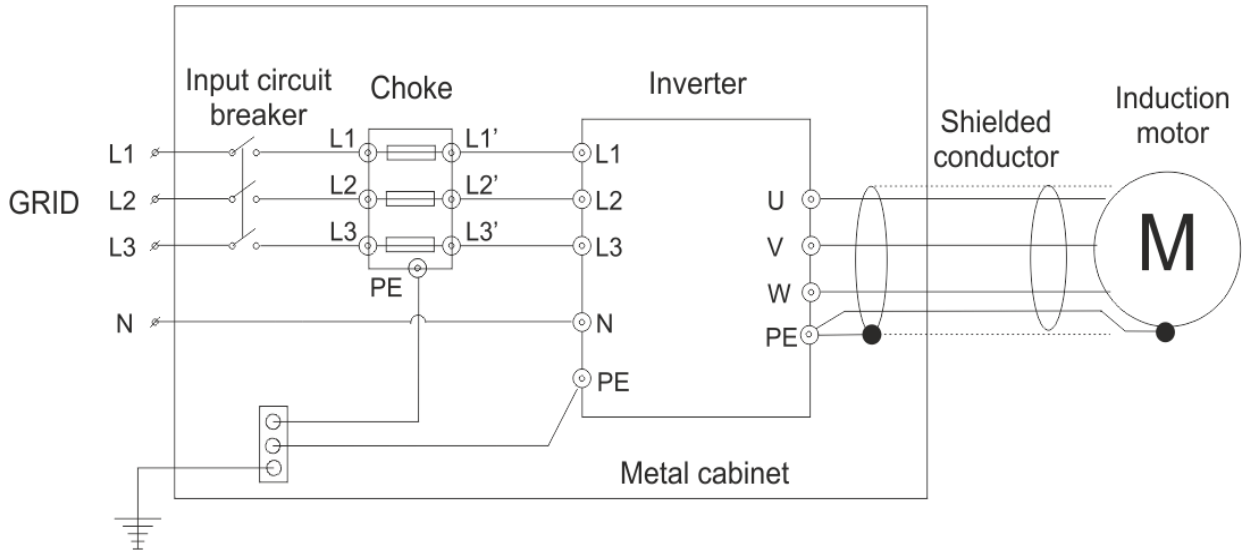


Figure 4.12. Connection block scheme of inverters type ELDI / DF and ELDI / D – from 7,5 kW to 55 kW

The correspondence between the power of the inverter and the type of filter is given in *Table 4.12*.

Table 4.12. Type of input filter – from 7,5 kW to 55 kW

Type of filter	***Power of the inverter, kW***	***Inductance, mH***
РК - 1035	from 7,5 to 11,0	1,5
РК – 0560	from 15,0 to 22,0	0,5
РК – 02113	from 30,0 to 37,0	0,2
РК – 02116	from 45,0 to 55,0	0,2

4.3.4 Protective earth of the inverter

Protective earth is performed on terminals marked PE or ⏚

Way of grounding of several inverters is shown in *Figure 4.13.*

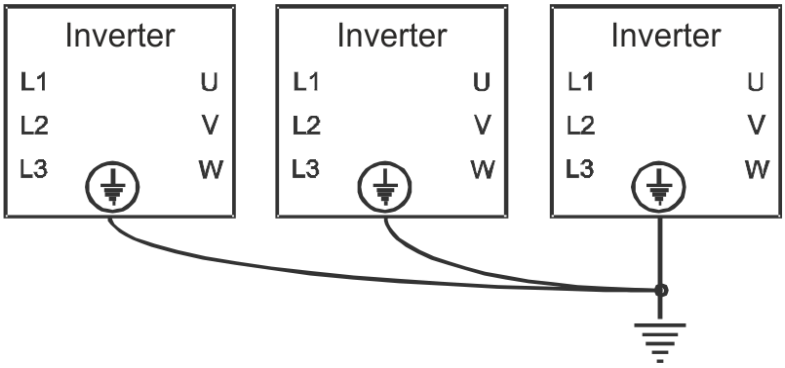


Figure 4.13. Grounding of several inverters

4.3.5 Connecting the control terminal

Connecting the control terminal for inverters type ELDI is shown on *Figure 4.14.*

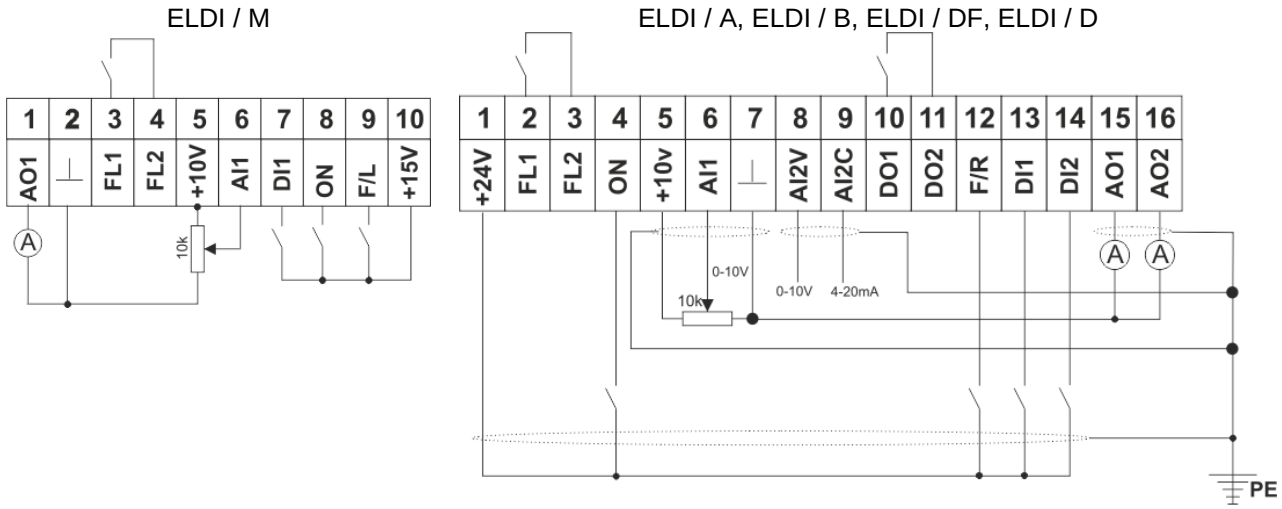


Figure 4.14. Connecting the control terminal

4.4 Input - Output interface description

4.4.1 Digital inputs

ON When submitting a + 24V at input **ON** (for ELDI / M + 15V) starts the converter, ie gives him a work permit. This is only possible when in option "**Int**" is selected "**IO**" control of the inverter from external signals - through input output interface (when in option "**Int**" is selected "**UI**" converter is controled from the keyboard). If in option "**Int**" there is another parameter the submission of input voltage will have no result!

The engine speed will depend on the voltage of the analog inputs described below and appropriate settings in "**LSP**" and "**HSP**".

F/R When the signal is 0 V (or if admission is free), the motor rotates in one direction. When on this input submit a signal of +24 V (for ELDI / M + 15V), the direction of rotation of the motor turns.

DI1 Програмируем input - When submitting a +24V (for ELDI/M +15V), the motor accelerates to the speed specified by parameter "**P1F**" with direction set by parameter "**P1d**". Acceleration / braking depend on the setting of parameters "**Acc/dcc**".

DI2 Програмируем input - When submitting a +24V (за ELDI/M +15V), the motor accelerates to the speed specified by parameter "**P2F**" with direction set by parameter "**P2d**". Acceleration / braking depend on the setting of parameters "**Acc/dcc**".

"**DI1**" and "**DI2**" also require in option "**Int**" to be selected "**IO**" control of input output interface in other words terminal block of the inverter.

NOTICE

At the same time activating the input "**ON**" and "**DI1**" or "**DI2**" the inverter is settled in position **Rdy**!

NOTICE

When the converter is operated by input-output interface provided time to work is limited by the timer. The timer setting may be different when you activate the transmitter of "**ON**" or by "**DI**" input. In the menu with the parameters the function "**tIO**" determines which timer is adjusted. Whether the timer is active or not shall be determined in "**tAI**". Time in sec. is adjusted in "**tI**". If the timer is used after the time expires comes out error message "**tout**". Any meanwhile stopping of the inverter resets the timers!

4.4.2 Digital outputs

FL1, FL2 Normally closed relay contact with parameters 0,1 A/220VAC (1A/30VDC). When the inverter is powered up and there is no displayed protection - the contact of the relay is closed! The opening of the contact means that any of the protections is activated or an error occurs. In the absence of the supply voltage relay contact is open.

DO1, DO2 Normally open relay contact with parameters 0,1A/220VAC (1A/30VDC). The contact closure of the relay can be configured via parameter "**do2**" (see *Table 6.1. Setting parameters*) for the following functions:
"**Srr**" - when reaching the frequency of the assignment (±2,5Hz hysteresis);
"**Ftc**" - when reaching the predetermined in the parameter "**FtA**" frequency;

4.4.3 Analog outputs

AO1, AO2 Those two analogue outputs (0/4-20mA) can be configured via parameters "**Ao1**" and "**Ao2**" for the following functions:
"**Sur**" - the corresponded output signal is proportional to the inverter output frequency;
"**SLc**" - the corresponded output signal is proportional to the inverter output phase current;

4.4.4 Analog inputs

The choice of input for setting speed is determined by the state of parameter "**Acr**" (see *Figure 4.15*, *Figure 4.16*, *Figure 4.17*).

AI1 0 - 10V - Speed reference. By changing the voltage level it changes the output frequency (i.e., motor speed) in the range "**LSP**" "**HSP**".
AI2V 0 - 10V Speed reference.
AI2C 4 - 20mA Speed reference.

Analog inputs colud be assigned through the parameter "**Acr**". Input structures are:

"**rEF**": Control of the output frequency (motor speed) by changing the level of "**AI1**" (see *Table 6.1. Setting parameters*).

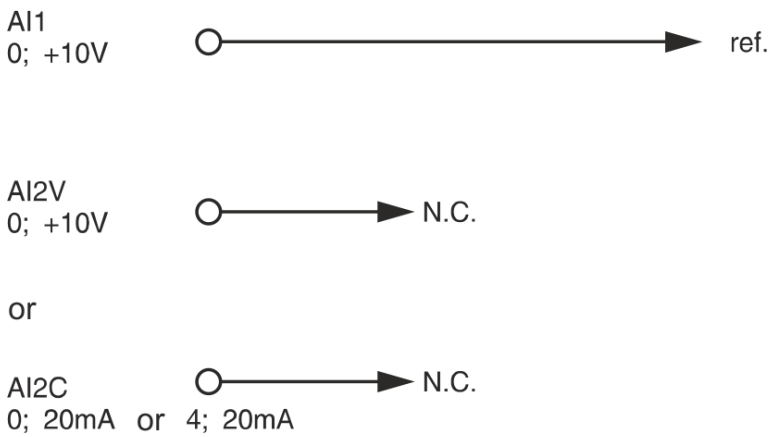


Figure 4.15. Control of the output frequency

"**Sri**": Adding a value of "**AI2**" to "**AI1**" (see "*Setting parameters*").

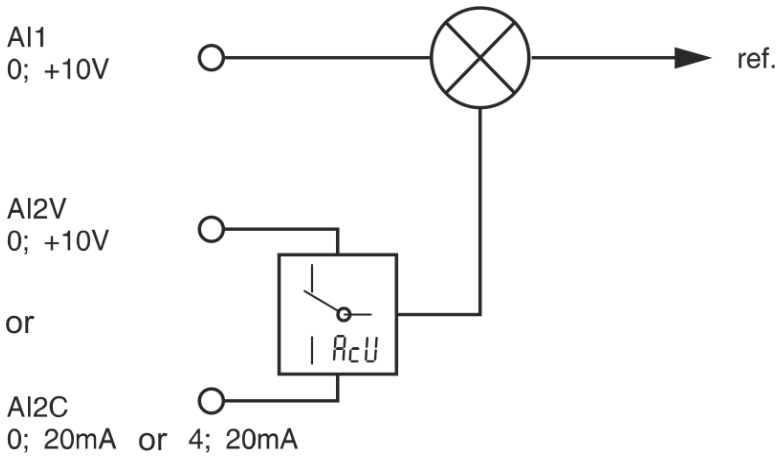


Figure 4.16. Adding a value of *"**AI2**" to "**AI1**"*

"**PiF**": PI regulator (see "*Setting parameters*").

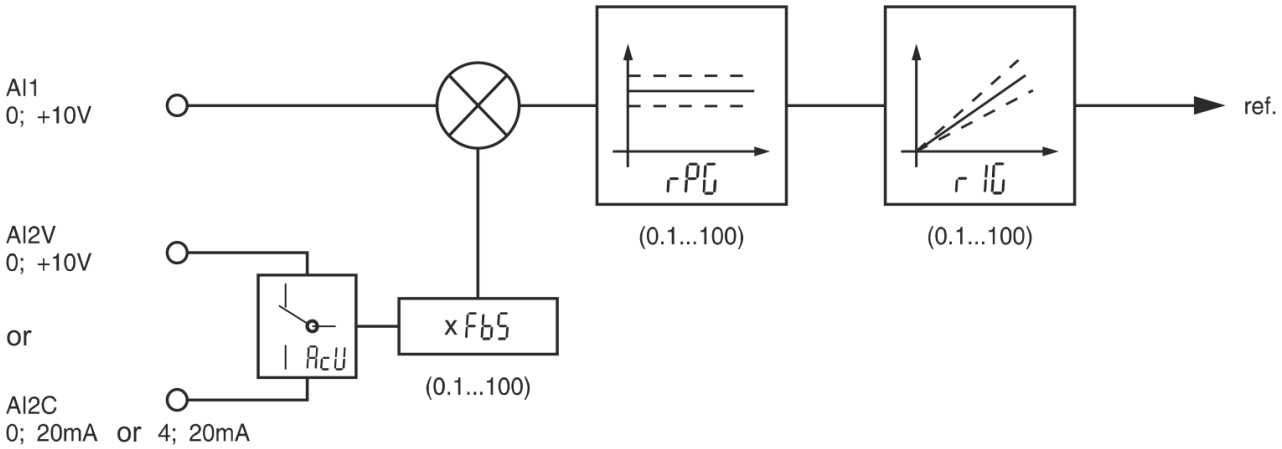
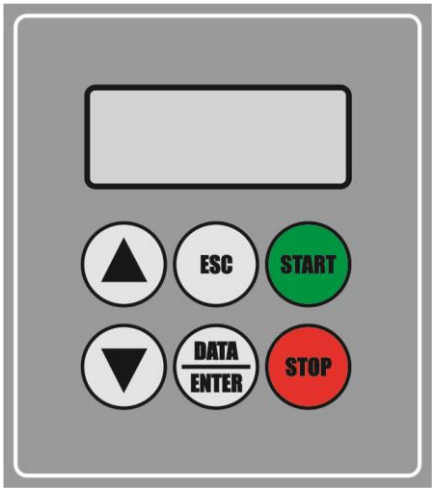


Figure 4.17. PI regulator

The choice of which of the two inputs ("**AI2V**" or "**AI2C**" - see *Figure 4.14*) to submit feedback signal by frequency is done by the parameter"**AcU**" (see *Table 6.1. Setting parameters*).

5 Users interface



motor start

motor stop

when you are in the menu of parameters the button enters correcting (visualization) parameter mode.
In mode adjustment of parameter with this key confirms the new value.

when you are in mode adjustment of parameter with this key you can return to the menu of parameters without saving the current setting

in the main menu of the parameters, these keys serve to select the desired parameter. In mode adjustment of parameter with them you can change the current value of the parameter.

Figure 5.1. Keyboard description

5.1.1 Working with keyboard

Working with keyboard can be split into two main modes visualization and adjustment. In both modes the movement in the main menu with parameters going on with the "**arrow"** buttons.

1. Entering in visualization mode it happens when you reaching the visualization parameter and then press the button "**DATA/ENTER**". Pressing tha button "**ESC**" leads to exit this mode and return to the main menu with parameters.

2. Entering in adjustment of parameter mode it happens when you reaching the desired parameter and then press the button "**DATA/ENTER**". Once you are inside the parameters you can change the value with the "**arrow**" buttons. To save the new value is sufficient to press "**DATA/ENTER**", which will return us to the main menu with parameters. Cancel or exit without saving the value of parameter you can do by pressing the button "**ESC**".

Setting a parameter is done by the following sequence of actions:

a. Finding the desired parameter in the menu of parameters using the "**arrow**" buttons.
b. Entering in mode adjustment of parameter using button "**DATA/ENTER**".
c. Change the value of parameter using the "**arrow**" buttons.
d. Save the parameter by pressing a button "**DATA/ENTER**".
e. Return to the main menu with parameters without saving the change of the parameter by button "**ESC**".

NOTICE

Saving the parameters becomes after pressing the button “**DATA/ENTER**”.

NOTICE

The parameters of the inverter are organized into two levels of access. In the first level are parameters which are necessary for the daily operation of the device, ie it is required frequent changes of their values. In the second level are parameters for which it is not required frequent changes of their values. In this level are also the parameters which the user must change with particular caution, because changing them can cause incorrect operation of the entire device.

The parameters are sepparated in two types of:

- Parameters for visualization “B”. With this type of parameters is displayed current value of the parameter. This includes: value of the output frequency, direction of rotation of the motor, current in the motor, etc. When on the terminal is displayed parameter of this type, the keys up, down and enter are inactive.
- Parameters for adjustment “H”. With this type parameters can be adjusted the characteristics of the inverter.

NOTICE

When you change the parameter values during operation of the motor it must be ensured that this will not lead to an accident. It is recommended that changes to the parameters must be done only when the motor is stopped.

On *Figure 5.2, 5.3, 5.4* and *5.5* are shown some examples for working with the keyboard.

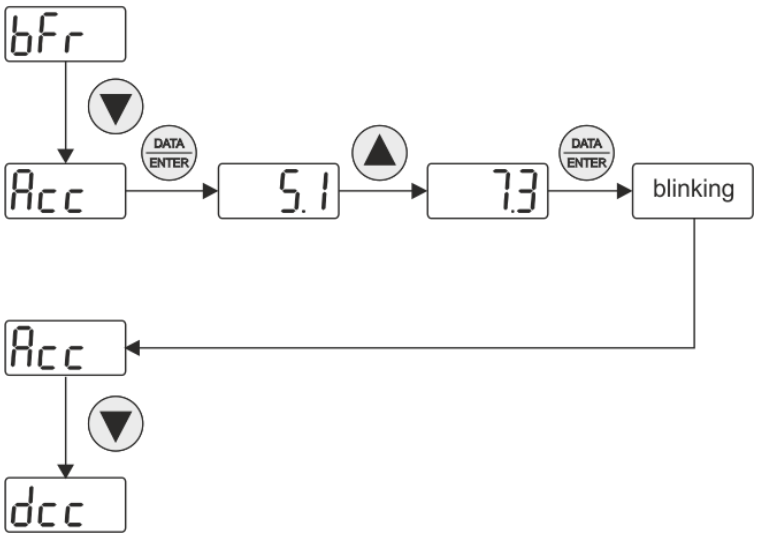


Figure 5.2. Example 1 – Setting of acceleration time

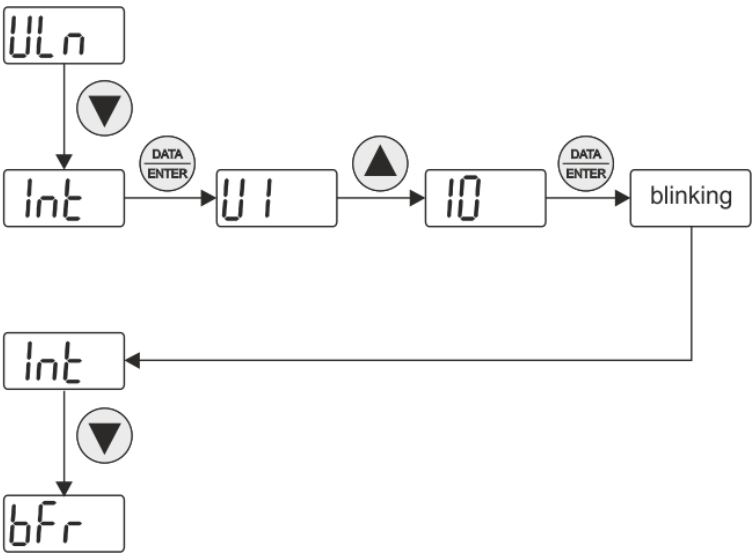


Figure 5.3. Example 2 - Setting the control interface

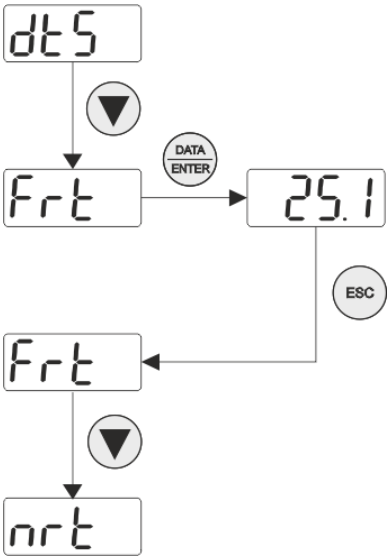


Figure 5.4. Example 3 - Visualization of current output frequency

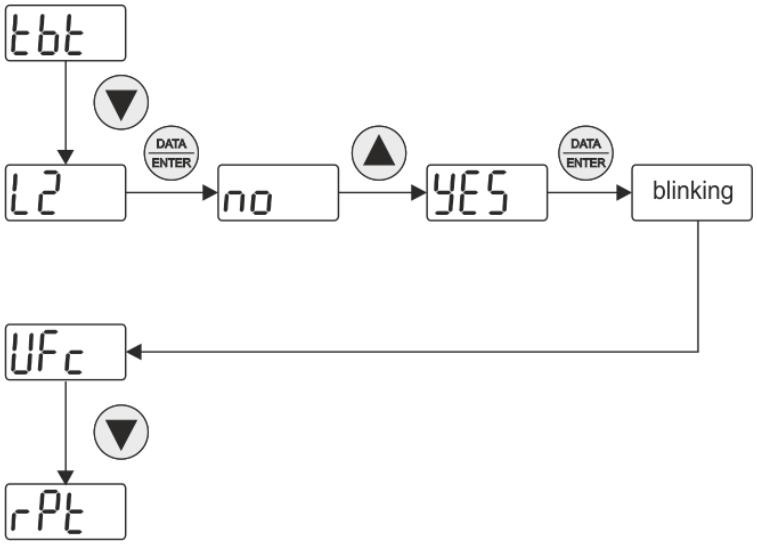


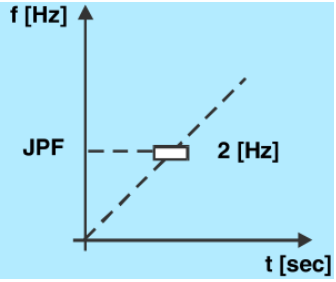
Figure 5.5. Example 4 - Passing to second level of the parameters

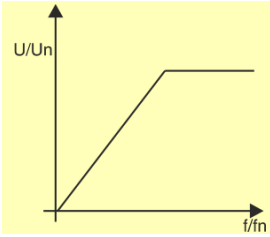
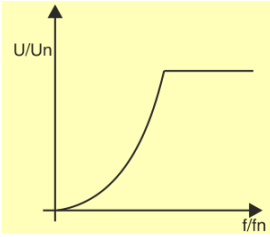
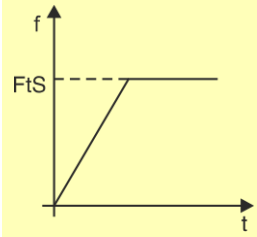
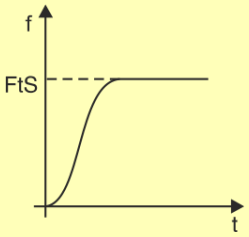
6 Setting parameters

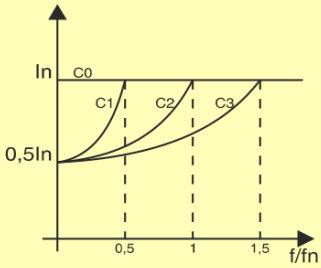
Table 6.1. Setting parameters

Code	Function	Parameter type	Factory settings	Minimum value	Maximum value	Unit	Resolution
	Level 1						
	Inverter state						
CLd	- charging the capacitors						
CSL	- catching spinning load						
-rdy	- stopped motor. A dash indicates the direction in which it will rotate the motor after startup						
_rdy							
- on	- spinning motor. A dash indicates the direction or the value of the selected from dSP menu parameter of the motor – n, F, I, U – accordingly speed, frequency, current, voltage						
_ on							
dcb	- DC brake						
	If on the display is shown blinking or not described above symbolics, it means that an error occurred. For a description of error codes, please see *Table 7.1* and *Table7.2.*						
dSP	Parameter to be displayed in rdy menu after starting	H	on	on, F, n, I, U		-	-
FtS	Output frequency reference at "**Int**"="**UI**"	H	50	LSP	HSP	Hz	-
dtS	Rotating direction reference at "**Int**"="**UI**"	H	F	F, r		-	-
Frt	Output frequency	B				Hz	-
nrt	Speed of rotation	B				rpm	-
drt	Rotating direction	B				-	-
Icr	Motor current	B				A	-
ULn	Supply voltage	B				V	-
Int	Active interface – determining how to start, stop, set the speed and direction	H	UI	UI, IO, CbL, Pot		-	-
	"**UI**" – **START** and **STOP** from the buttons, reference for output frequency by "**FtS**", and rotating direction by "**dtS**" **"IO"** – managed by the Input / Output interface see *Figure 4.16* **"CbI"** – managed by RS 485 port **"Pot"** - **START** and **STOP** from the buttons, the rotating direction by "**dtS**", output frequency from the potentiometer on the front panel (valid only for models ELDI / M with external potentiometer)						
bFr	Base inverter frequency. The frequency at which the output voltage reaches the max value = the value of the supply voltage. At 40 Hz setting will follow a larger moment on the motor shaft at 40 Hz, but more current at idle.	H	50	40	60	Hz	-
Acc	Time for acceleration	H	5,0	0,1*	3600	s	-
dcc	Time for deceleration	H	5,0	0,1*	3600	s	-
	The time depends, also from additional paremter "**rtP**" located in "**Level 2"**. It is possible to use coasting, please see "**Stt**".						
LSP	Minimum value of the output frequency	H	0	0	HSP	Hz	-
HSP	Maximum value of the output frequency	H	50	LSP	200	Hz	-
CLL	Currnet limiting - low level	H	120	50	160	%In	-
CLH	Currnet limiting - high level	H	160	CLL	180	%In	-
	Current limiting function prevents the current through the motor to exceed a specified level. This is done to protect the inverter of overloading. The *low level* of current limiting operates only in acceleration mode of the motor, ie if the motor current exceeds this level, the acceleration of the motor will be stopped while the current falls below this level. The *high level* of current limiting operates under acceleration, in fixed mode and when braking.						

* Different for some models. M - 0,1; A, B, DF и D – 0,3.

Code	Function	Parameter type	Factory settings	Minimum value	Maximum value	Unit	Resolution
JPF	 Critical frequency jump. This parameter auto add / substract ± 2 Hz , when reaching the JPF value. This is done to avoid operation of the motor at a speed at which the mechanical resonance occurs.						
	Когато този параметър има стойност нула, функцията е деактивирана.						
Idc	Ниво на тока на DC спирачката	H	25	25	70	%In	0,1
tdc	Време за работа на DC спирачката (само когато **Fdc** = **Fin**)	H	0	0	25	s	1
	When this parameter is zero, the DC brake is disabled.						
Sdc	**InF** – after stopping the motor is established in mode DC brake for time until the next startup. This means that the initially supply of the motor will not be established at the mode of the DC brake. **Fin** – the operating time on the DC brake is determined by "**tdc**".	H	Fin	Fin, InF		-	-
Fdc	Frequency, by which is triggered the DC brake	H	0,0	0	HSP	Hz	0,1
Pbl	"Boost" – boosting the amplitude of the output voltage => boosting the moment of the motor at low speed, but more current of the motor at idle.	H	5	0	20	%Un	0,1
tbl	Level	H	0	0	20	%Un	0,1
tbt	Time	H	0	0	10	s	0,1
	Level and time of the temporary boosting amplitude of the output voltage. When the time is zero, the "temporary boost" is disabled.						
	Preset rotation speed, controlled by digital inputs activated by input terminal see *Figure 4.14*						
	DI 1:						
P1F	Frequency	H	0	LSP	HSP	Hz	0,1
P1d	Direction	H	F	F, r		-	-
	DI 2:						
P2F	Frequency	H	0	LSP	HSP	Hz	0,1
P2d	Direction	H	F	F, r		-	-
	PI regulator configuratiing:						
rPG	Proportional gain	H	1	0,1	100	-	0,1
rIG	Integral gain	H	1	0,1	100	1/s	0,1
FbS	Feedback gain	H	1	0,1	100	-	0,1
FLt	Display the last falt occured	B					
	The errors descriptions are in *Table 7.1* and *Table 7.2* The errors participate as corresponding No in *Table 7.1* and *Table 7.2*						
L2	"**Level 2**" enter (see *Figure 5.3*)	H	no	YES, no		-	-

Code	Function	Parameter type	Factory settings	Minimum value	Maximum value	Unit	Resolution
	Level 2						
UFc	Type of the **U/F** curve	H	Lin	Lin, Fcr		-	-
	Lin – linear, 		**Fcr** - square 				
StE	Stopping way	H	dcc	dcc, Inr1, Inr2		-	-
	"dcc" – control stop in function of the time refered in the "**dcc"**. **"Inr1"** – coasting. When setting this parameter any subsequent start becomes, by offsetting of the motor regardless of the setting in the function "**SPr**". Before using this function "**Inr1"**, please consult first with the manufacturer! **"Inr2"** – coasting. In each subsequent start does not pass through the function for interception of rotatable motor.						
rPt	Type of the acceleration (deceleration) function	H	Lin	Lin, Scr		-	-
	Lin – linear, 		**Scr** – S type, 				
rtP	Specifying the acceleration and deceleration time	H	Fn	Fn, FtS		-	-
	"Fn" – the adjusted in **Acc** and **dcc** parameter is the time for acceleration or deceleration of the motor to or from its rated frequency "**FrS**". **"FtS"** – the adjusted in **Acc** and **dcc** parameter is the time for acceleration or deceleration of the motor to or from reference frequency (at "**Int**" = "**UI**" – this in menu "**FtS**", or at "**Int**" = "**IO**" – set by external terminal).						
FrS	Rated motor frequency	H	50	50	60	Hz	10 Hz
nrS	Reted motor speed (RPM). The correct setting depends on the correct visualization "**nrt**"	H	1000	600	3000	rpm	1
SFr	Swithching frequency	H	4	2	12	kHz	1 kHz
SPr	Catch spinning motor	H	no	YES, no		-	-
	Used in frequent failures of the line voltage if the motor rotates a large inertia mass. To operate the function, management must be **IO** in function "**Int**" and after restoring the voltage it must be given permission (**ON** to 24V, see *Figure 4.14*). **If permission was not given, and the motor spins - after inclusion (and the motor is not stopped), there is a possibility for an electric shock in the motor and burning of the inverter!** YES – function is active no - function is not active						
ArE	Automatic restart:	H	YES	YES, no		-	-
	YES - function is active **no** - function is not active (see "Electronic protection of the inverter")						
AdE	Automatic deceleration:	H	YES	YES, no		-	-
	YES - function is active **no** - function is not active. Adjust the deceleration time depending on the DC voltage.						

Code	Function	Parameter type	Factory settings	Minimum value	Maximum value	Unit	Resolution
ItA	**I2t** protection:	H	YES	YES, no		-	-
	YES - function is active **no** - function is not active. Integrates the motor current when **Iдвиг** > **In**, and do not allowing the motor to overheat.						
ItC	**I2t** protection – motor cooling type:	H	C0	C0, C1, C2, C3		-	-
			C0 – motor with strong independent cooling; C1 - motor with low independent cooling; C2 – self cooling motor; C3 – motor with poor cooling;				
FcE	Management of the fan:	H	On	On, t		-	-
	on – it works at Run, DCBrake and Catch states; **t** - depending on the temperature;						
do2	**DO2** contacts closing (see *Figure 4.14*)	H	Ftc	Srr, Ftc		-	-
	"**Srr**" – reaching the reference frequency. ("**Int**" = "**UI**" set in by parameter "**FtS**", or "**Int**" = "**IO**" set by external terminal); "**Ftc**" – reaching the specified frequency by "**FtA**"						
FtA	Frequency at which **DO2** will switch if it is configured as **Ftc**, in the parameter **do2**.	H	45	LSP	HSP	Hz	0,1
Acr	Assignment of the input structure in **AI1** and **AI2V**(**C**) see *Figure 4.15, 4.16* and *4.17*	H	rEF	rEF, Sri, PiF		-	-
AcU	Choosing the **AI2** type: **C** – **AI2C** current (4;20mA) **U** – **AI2V** voltage (0;10V)	H	U	C, U		-	-
	Choosing the value to be output on the analog outputs:						
Ao1	**AO1**	H	Sur	Sur, SLc		-	-
Ao2	**AO2**	H	Sur	Sur, SLc		-	-
	"**Sur**" - the output voltage is proportional to the output frequency; "**SLc**" - the output voltage is proportional to the output motor current;						
t IO	Choosing a timer for setting. Confirming one of the two parameters we get access to **tAi** and **ti**. Otherwise after **tIO** the display shows **InA**.	H	On	On, dI1		-	-
tAI	Adjustment the selected from the menu **tIO** – "**ON**" or "**dI1**", timer whether will be active or not.	H	no	YES, no		-	-
tI	Setting the time of the respective timer selected in **tIO** menu.	H	0	0	255	s	1
InA	Individual network address	H	1	1	128	-	1
GnA	Group network address	H	129	129	255	-	1
nbr	Speed of exchange over the network	H	9600	75, 150, 300, 600, 1200, 2400, 4800, 9600		bps	-
dFt	Return to the factory settings values for all parameters	H	YES	YES, no		-	-
CPU	Software version	B					

7 Electronic protection of the inverter

The inverter has an integrated protections which protect itself and the connected motor:

- Protection from over and under voltage;
- Protection from overheating the inverter;
- Protection from over load the motor - I2t protection;
- Protection from short circuit on the motor terminals;
- Protection from earth falt – output terminal shorted to input;
- Protection from no conection in the current loop AI2C;
- Protection from damage the memory, containing the parameters;
- Protection from overcurrent the inverter;
- Internal software errors;

The recovery after activating protection status "**rdY**" depends on the setting of parameter "**Art**".

Built-in protections are two types: those that can recover automatically and those that necessarily require external intervention.

These two groups are shown respectively *Table 7.1* and *Table 7.2.*

NOTICE

Activating the **Art** function for automatic recovery for automatic reinstatement to work after the occurrence of protection can lead to automatically startup of the inverter and the associated motor.

Protections that can recover an infinite number of times in **Art** = **YES**:

Table 7.1. Recover an infinite number of times in Art=YES

No:	***Protection:***	***Probable cause:***	***Action:***
0	**USF** – undervoltage	- mains supply voltage is too low - momentary drop in voltage	- check the mains voltage and the type of inverter - reset the inverter
2	**OLF** – motor overload	- motor or load are too big - bad adjustment of the **I2t** protection	- check the type of the motor and load - check the adjustments of **I2t** protection
3	**OHF** – overheat the inverter	- poor cooling, a dusting - the cooling didn't work	- Improve the cooling, provide additional ventilation if necessary

Protections which are recovered at a limited number of times in **Art** = **YES**:

Table 7.2. Recovered at a limited number of times in Art=YES

No:	*Protection:*	*Probable cause:*	*Action:*
1	**OSF** – overvoltage	- mains voltage is too low - mains disturbance - decelarating time is too small. The motor got to big inertia	- check the mains voltage and type of inverter - increase the deceleration time, add external brake resistor if necessary
4 7 6	**SC**, **SC1**, **HII** – short circuit	- short circuit in the motor or at the outputs of the inverter - fault in motor or error in the settings in of the inverter	- check the motor windings and connections - check the adjustment of **Acc**, **pbl** of the inverter. There may be a dropped phase of the motor.
5	**EF** - eartth fault	- shorting output motor phase to input or PE	- check the motor windings and connections
8	**E2** - parameter memory lost	- internal fault	- return the inverter for servicing / repair
10	**tout** - expiration of the time set in **tAI**		- if it does not suit you, disable the corresponding timer (see the description of the input-output interface).
9	**CLF** – no conection in the current loop **AI2C**	- no conection in the current loop **AI2C**	- check the **AI2C** loop

The restoration of readiness state (**rdY**) is done by turning off the power, waiting the display to go off and then reconnect again. If the next time you start the inverter and again is activated protection it is necessary to send the unit for repair.

8 EC - Declaration of Conformity

ДЕКЛАРАЦИЯ ЗА СЪОТВЕТСТВИЕ

Долуподписаният, **"ЕЛЕКТРОИНВЕНТ" ООД**
гр. София, 1407
бул. "Черни връх" № 43
телефон: (+359 2) 868 70 65, факс: (+359 2) 962 52 63

декларирам на собствена отговорност, че:

Продуктът: "Инвертор за управление на асинхронни ел. двигатели "
с търговска марка ELDI

е конструиран и произведен, съгласно установената инженерна практика по отношение на безопасността в съответствие с приложимите към него съществени изисквания на:

Директива 2006/95/ЕС, въведена с "Наредба за съществените изисквания и оценяване на съответствието на електрически съоръжения, предназначени за използване в определени граници на напрежението",

и

по отношение на електромагнитната съвместимост в съответствие със съществените изисквания на *Директива 2004/108/ЕС, въведена с "Наредба за съществените изисквания и оценяване на съответствието за електромагнитна съвместимост"* ,

като са изпълнени изискванията съответно на следните български стандарти, въвеждащи хармонизирани европейски стандарти:

БДС EN 50178:2003 (EN 50178:1997)

и

БДС EN 61800-3:2003 и БДС EN 55011+A1:2003

При правилното му монтиране, поддържане и използване по предназначение по начин указан в придружаващата го инструкция не застрашава живота и здравето на хората, безопасността на домашните животни, интересите на потребителите и опазването на околната среда и вещите.

Декларирам, че ми е известна отговорността, която нося съгласно чл. 313 от НК

гр. София
28.01.2010 год

Управител:
/ инж. Юлиян Горчанов /

ЕЛЕКТРОИНВЕНТ София ООД

Figure 8.1 EC – Declaration of Conformity

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